

REMARKS

I. Status of the Claims and the Rejections

Claims 19, 21, 22 and 28 were withdrawn by the Examiner for being directed to an invention considered to be independent from the other pending claims. Applicants respectfully disagree with this view. Nonetheless, applicants have amended claim 21 such that it depends from claim 27 rather than withdrawn claim 19. Applicants respectfully request that claim 21 be reinstated to the application.

Substantively, claims 27 and 29-32 were rejected for alleged obviousness under 35 U.S.C. § 103 based on Plattner U.S. Patent No. 6,658,881 ("Plattner") in view of Chiang U.S. Patent No. 6,481,228 ("Chiang"). Applicants respectfully traverse this rejection.

However, applicants have amended independent claims 27 and 32 to further clarify the subject matter regarded as patentable. Applicants have also amended claim 21 and canceled claim 30. In view of these amendments and the following remarks, applicants respectfully request reconsideration and allowance.

II. Claims 21, 27, 29, 31 and 32 are Not Obvious

A. The Claims

Independent claim 27 is directed to an aircraft having a cooling device for expelling heat from a heat source to a heat sink. The cooling device includes a first piping system including a heat intake section coupled with the heat source, a heat output section coupled with the heat sink, and a heat conveyance medium flowing in the first piping system and changing phase from gaseous to liquid and back to gaseous. The cooling device also includes a heat exchanger operatively coupling the first piping system to the heat source, a ventilator configured to control the transfer of heat from the heat source to the heat exchanger, and a

temperature sensor for detecting the temperature of the heat source. The cooling device also includes a cold storage unit for collecting cooled liquid phase heat conveyance medium for use when cooling requirements are increased. The cooling device further includes a second piping system thermally coupled to the heat source and the heat sink. The cold storage unit is located in a secondary closed circuit defined by the second piping system.

Claims 21, 29, and 31 depend from independent claim 27 and recite additional features of the cooling device. For example, claim 31 further recites that the heat sink is located geodetically higher than the cold storage unit, which is located geodetically higher than the heat source.

Independent claim 32 recites a method for the discharge of heat from a heat source located in an aircraft to a heat sink. The aircraft includes first and second piping systems extending from the heat source to the heat sink, and further includes a cold storage unit located in the second piping system. The method includes causing heat transfer at a heat intake section with a heat exchanger, controlling that heat transfer with a ventilator, and controlling a quantity of heat conveyance medium flowing to and from the heat exchanger with a regulator valve. The method also includes "storing cooled liquid phase heat conveyance medium in the cold storage unit while the aircraft is flying; and releasing stored liquid phase heat conveyance medium from the cold storage unit to the heat source when the aircraft has an increased cooling requirement."

B. The Deficiencies of the Cited Prior Art

Plattner discloses an air conditioning system (14) in an aircraft. As shown in FIG. 1, the air conditioning system includes a closed pipe circuit connected a condenser (12), a receiver (18), an expansion valve (20), an evaporator (22), and a compressor (24) in series. The condenser is configured to be mounted along the outer surface of the aircraft and receives outside air for cooling and condensing a refrigerant in the closed pipe circuit. The evaporator circulates

air from the cabin of the aircraft to heat and evaporate the refrigerant in the closed pipe circuit. The Office Action states that the condenser of Plattner is the "heat output section" of the claims and the evaporator is the claimed "heat intake section." The Office Action also states that Plattner fails to teach the ventilator, temperature sensor, regulator valve, and regulation device of the independent claims. Nonetheless, the Office Action cites Chiang for these missing elements.

Chiang is directed to an air-conditioning unit for a room partition panel. As shown in FIG. 23, the partition panel (10) includes an air inlet (13) adjacent to a blower (40) for producing flow in the panel and a temperature sensor (41). The panel also includes an air outlet (12) adjacent to a heat exchanger (30). The heat exchanger heats or cools the air flowing through the panel via heat transfer with a supply of water traveling through the piping of the heat exchanger from a supplying duct (20) to a returning duct (21). A controller (42) configured to control the blower (40) and a valve (38) in the supplying duct (20) is mounted on the partition panel. The Office Action states that it would have been obvious to use the heat exchanger, blower, temperature sensor, valve, and controller of Chiang with the evaporator of Plattner to arrive at the claimed invention.

Applicants disagree. Among other reasons, the relied upon combination of Plattner and Chiang still fails to include every element of independent claims 27 and 32. More particularly, claims 27 and 32 now recite first and second piping systems extending from the heat source to the heat sink, the second piping system defining a secondary closed circuit for the cold storage unit. This subject matter was previously recited in claim 30. The Office Action states that Plattner teaches embodiments with the condenser located at various positions along the aircraft exterior: along the top of the fuselage in FIGS. 7A-7D and along the bottom of the fuselage in FIGS. 8A-8D. Then, the Office Action states that it would have been obvious to

duplicate the entire cooling system of Plattner with cooling units on the top and the bottom of the aircraft to provide a greater cooling capacity. Office Action, page 5.

However, Plattner actually teaches away from the cooling system suggested in the rejection. Plattner teaches that the condenser (12) "may be mounted in any location on the aircraft 16 that provides sufficient air flow while not impeding the function of the aircraft 16." Col. 3, lines 10-13. To this end, the enclosure (70) configured to hold the condenser (12) is designed with a "slim, substantially rectangular aerodynamic design" to reduce unnecessary additional drag force on the aircraft. Col. 5, lines 26-32. Furthermore, the present application observes that one disadvantage of prior cooling systems is high weight. Page 2, lines 11-17.

In view of these two well-understood design constraints in aircraft (e.g., limiting aerodynamic drag and weight), one of ordinary skill in the art would not have been motivated to duplicate the entire cooling system disclosed in Plattner because doing so would have added significant aerodynamic drag and weight to the cooling system. The Office Action still fails to supply an objective reason why a person of ordinary skill in the art would disregard these two well-understood design constraints.

Additionally, the duplicative system proposed in the Office Action would not address the problems associated with temporarily accommodating a heightened cooling requirement in the same manner as the current invention. The cold storage unit of the claimed invention acts as a reservoir for storing significant amounts of cooled heat conveyance medium within a completely independent, secondary cooling circuit. The so-called "storage" capacity of the receiver/dryer (18) in Plattner is minimal and is only used in the separation of liquid phase refrigerant and gaseous phase refrigerant that occurs within the receiver/dryer. To this end, the coolant in the receiver/dryer would never be released to the heat source as recited in claim 32

because this would render the receiver/dryer inoperable. Furthermore, Plattner never describes that the receiver/dryer is disposed in its own completely independent, secondary cooling circuit.

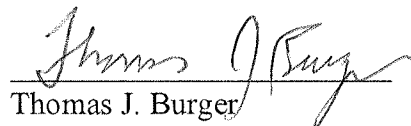
For at least these reasons, the hypothetical modification of Plattner and Chiang is improper and deficient with respect to claims 27 and 32. Consequently, claims 27 and 32 are allowable over the cited references. Each of dependent claims 21, 29 and 31 depends from claim 27 and includes one or more additional features in combination with the features of claim 27. For substantially the same reasons set forth above with respect to claim 27, and further because the cited prior art fails to teach or suggest the subject matter recited in the claims, applicants respectfully submit that each of claims 21, 29 and 31 is also patentable. Applicants respectfully request that the rejection of claims 21, 27, 29, 31 and 32 be withdrawn, and that these claims be allowed.

III. Conclusion

Based on the amendments to the claims and these remarks, applicants respectfully assert that all present claims are in condition for allowance, and respectfully requests an allowance without further delay.

Applicants believe that no fee is due for this filing. But if the USPTO disagrees, please consider this as an authorization to charge Deposit Account 23-3000.

Respectfully submitted,



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